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ERING DATA

ON

THE SANITARY DISTRICT OF CHICAGO

JULY—1921

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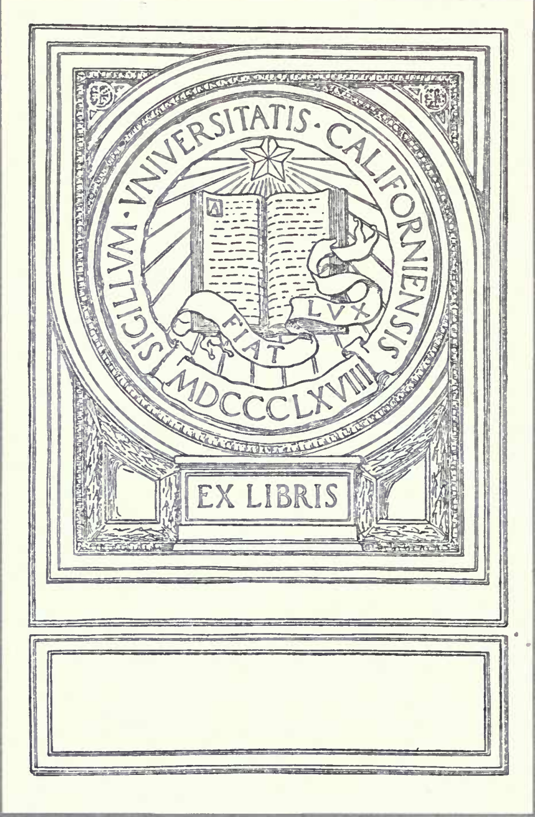
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ENGINEERING DATA

ON

THE SANITARY DISTRICT OF CHICAGO

UNIV. OF CALIFORNIA

JULY—1921

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CALIFORNIA

THE SANITARY DISTRICT OF CHICAGO

1921.

BOARD OF TRUSTEES.

Morris Eller
William J. Healy
Lawrence F. King
James H. Lawley
Harry E. Littler
Matthias A. Mueller
Willis O. Nance
Charles H. Sergel
Alexander N. Todd

OFFICERS.

Lawrence F. King, President
Walter E. Schmidt, Treasurer
Albert W. Dilling, Chief Engineer
William F. Mulvihill, Attorney
William W. Smyth, Clerk

ENGINEERING DEPARTMENT.

Albert W. Dilling	Chief Engineer
Edward F. Moore	Asst. Chief Engineer
Julius R. Hall	Prin. Asst. Engineer
Langdon Pearse	Sanitary Engineer
Samuel Moreell	Bridge Engineer
H. P. Ramey	Senior Asst. Engineer
H. I. Steffa	Mechanical Engineer
F. W. Mohlman	Chemist
I. T. Roberts	Electrical Engineer

OFFICES.

7th Floor, 910 South Michigan Avenue
Chicago.

M215137

THE SANITARY DISTRICT OF CHICAGO.

Purpose.

To provide for the disposal of sewage of the District by dilution and outlet into the Illinois River, and to provide such other sewage disposal as shall preclude the contamination of Lake Michigan water supply.

By subsequent charter, the District utilizes the water power which is incidentally created.

Charter requires a minimum dilution of 200 c.f.p.m., or 3.33 c.f.p.s., for every 1,000 people.

Chartered 1889.

Bonds may be issued up to 3% of assessed valuation.

Taxes may be levied up to ⅔ of 1% of assessed valuation.

Area, 395.51 square miles, including all of Chicago.

Included in the District are forty-six incorporated villages and cities.

Population by 1920 census, 2,963,090.

MAIN CHANNEL AND DESPLAINES RIVER DIVERSION.

The Sanitary and Ship Canal.

Chicago (Robey Street) to Lockport (Controlling Works).

Length, 28 miles.

Work started September 3, 1892, water turned in January 2, 1900.

Earth Section, Robey Street to Summit.

Length, 7.8 miles.

Bottom width, base, 162 feet.
Grade, 1 in 40,000.
Depth, 24 feet.

Side slopes,
1 on 2 on south side.
1 on 1 on north side.

Earth and Rock Section, Summit to Willow Springs.

Length, 5.3 miles.

Bottom width, base, 202 feet.
Grade, 1 in 40,000.

Depth, 24 feet.
Side slopes, 1 on 2.

Rock Section (Rectangular) Willow Springs to The Controlling Works

Length, 14.95 miles.

Bottom width, 161 feet.
Grade, 1 in 20,000.
Depth, 24 feet.

Vertical channeled sides, or masonry walls on rock.

Desplaines River Diversion.

Length, 13 miles.

Cost.

Right of way	$ 2,365,296.39
Construction	20,844,684.40
Bridges	2,585,083.21
Controlling Works (see page 8)	337,055.86
Engineering (see note)	1,308,012.73
Total cost of original Main Channel	$27,440,096.59

Note: Includes part of Engineering on Main Channel Extension.

DESPLAINES RIVER IMPROVEMENT (Joliet Project).

Straightening, widening, and deepening the Desplaines River from the controlling works through Joliet to McDonough Street.

Length, 6 miles.

Work was started on March 25, 1898, and completed September 30, 1901.

Cross Sections.

Controlling works to 16th Street (Lockport), 600 feet wide, 3 feet deep. Sixteenth Street (Lockport) to E. J. & E. R. R., utilizes natural river channel. E. J. & E. R. R. to upper basin (Joliet), 240 feet wide and 5 feet deep and 140 feet wide and 7.5 feet deep. Upper basin to Jackson Street (Joliet), minimum width 200 feet, depth 5 feet.

Work also involved the rebuilding of dam No. 1 and the removal of dam No. 2, the removal of the Adams dam, the rebuilding of Lock No. 5, and the removal of the guard lock. The old bridges at Cass and Jefferson Streets were replaced by modern steel structures, and a concrete wall constructed between the river and the I. & M. canal extending from Lock No. 5 to Jefferson Street.

Cost.

Right of way	$ 676,711.93
Construction	1,309,063.46
Bridges	325,269.52
Engineering (Part only, see note)	21,907.25
Total	$2,332,952.16

Note: Remainder included in controlling works, Main Channel.

MAIN CHANNEL EXTENSION.

(Water Power Development.)

Controlling works, (Lockport) to Upper Basin Joliet).

Length, 4.25 miles.

Work was started on July 28, 1903, and completed August 27, 1907.

Current first delivered to Terminal Station in Chicago, November 26, 1907.

Cross Sections.

Controlling works to Power House (11,000 feet).

Varying width; minimum, 160 feet—vertical sides—depth, 24 feet.

Power House to E. J. & E. R. R. Bridge (6,000 feet); width, 160 feet; depth, 20 feet.

E. J. & E. R. R. Bridge to Upper Basin (5,500 feet); width, 160 feet; vertical sides; depth, 10 feet.

Cost.

Right of way	$ 29,520.70
Construction	1,910,733.09
Bridges	140,271.58
Movable dams at Power House (see page 8)	115,323.62
Lock at the Power House (see page 8)	165,842.50
Butterfly dam (see page 8)	220,115.25
Engineering (part only, see note)	12,457..25
Total	$2,594,266.00

Note: Remainder included in Main Channel.

CONTROLLING WORKS.

Seven Sluice Gates—Stony type, 30 ft. wide, 20 ft. vertical travel.

Bear Trap Dam—Crest, length, 160 ft.; oscillation, 17 ft.

Cost.

*Construction (see note)	$337,055.86
Engineering	162,630.97
Total	$449,686.83

Movable Dams at Power House.

Outlet from Forebay, 12 feet crest.
Outlet for Channel, 48 feet crest.
Vertical range, 14 feet.

Cost.

Construction	$115,325.63
Engineering (included in Main Channel)	
Total	$115,325.63

Lock at Power House.

Opened to navigation July 13, 1910.
Length, 130 feet. Width, 22 feet.
Gross lift, 40 ft.; mean lift, 36 ft.

Cost.

Construction	$165,842.50
Engineering (included in Main Channel)	
Total	$165,842.50

Butterfly Dam at the Controlling Works.

To Shut Off Forebay of Power House.
Weight of Dam proper, 710 tons.
Total weight of steel, 1,080 tons.
Movable leaf, 184 ft. long, 30 ft. high.
Contains 12 valves, each 6 ft. 4¼ in. x 4 ft. 1 in. high.

Cost.

Construction	$220,115.25
Engineering (included in Main Channel)	
Total	$220,115.25

*Note: Includes part of engineering in Des Plaines River Improvement.

POWER HOUSE.

Located 2 miles below Lockport.
Constructed in 1907; first power delivered Nov. 26, 1907.
(Entrance by pass only.)

Power available, 36,000 H. P.

Fall, 34 feet.

Power House—Fireproof, concrete, steel and tile, 385 ft. x 70 ft. x 47 ft. high.

Steel Racks and Concrete Ice Guard.

Turbines.

7 units, each 6,000 H. P., for generators now installed.

Provision for a total of 8 units.

Horizontal, Wellman-Seaver-Morgan Co. and S. Morgan Smith.

5,360 Electric H. P. each at 0.8 gate opening.

Flow, 100,000 cu. ft. per minute for each unit at 164 rev. per minute.

Generators.

7 units, each 4,000 K. W., direct connected.

Crocker-Wheeler 3 phase, 60 cycle A. C., 6,600 volts.

Rotors, 18 ft. 2 in. diameter, 164 r. p. m.

Exciters.

Each 350 K. W., direct connected.

2 Crocker-Wheeler, D. C. 250 volts, 300 r. p. m.

1 Western Electric, D. C. 250 volts, 300 r. p. m.

Transformers.

21 single-phase oil and water-cooled step-up—1,333 K. W. each, General Electric.

Transmission.

44,000 volts.

Cost.

Real estate	$ 20,000.00
Improvements to land	17,604.86
Structures	403,122.01
Races, gates, etc.	332,870.60
Equipment	622,115.28
Total	$1,395,712.75

TRANSMISSION LINES.

Power House to Terminal Station, 30 miles.

Poles.

Steel galvanized, 60 ft. high, set in concrete 6 ft.
Base, 42 in.; top, 24 in.; weight, 4,000 lbs. complete.
Two cross-arms. Set 350 ft. apart.

Wires.

Aluminum, 19 strands—270,000 C. M. Aluminum.
Spacing, 72 inches apart.
Three circuits complete.

TERMINAL STATION.

Western Avenue and Main Drainage Canal.

Building.

Concrete, 124 ft. x 70 ft. x 42 ft. high.

Transformers.

Step-down—From 44,000 to 12,000 volts to each of five sub-stations.

Sub-distribution—3 phase, 4 wire, 2,300-4,000 volts.

CITY LIGHTING.

The current of the Sanitary District is largely used in supplying lights for the streets and park systems. This is sold at a flat rate slightly below cost. The current is distributed from the Terminal Station by 12,000-volt lines to sub-stations from which the lighting circuits are operated.

The standards provide for a light every 350 feet on a street and every 250 feet in business districts.

The distribution of lights under the City lighting averaged:

Size of Lamp		No. of Lamps—1921
75 watt Tungsten	4 amp.	8,614
72 watt Tungsten	6.6 amp.	19,412
75 watt Madza C	4 amp.	87
100 watt Madza C	6.6 amp.	2,756
320 watt Madza C	20 amp.	16,073
414 watt Madza C	10 amp.	11,758
550 watt Madza C	20 amp.	910
25 watt Subway, Municipal		1,277
450 watt Flame arc, rented		54
320 watt Madza C, rented		100
414 watt Madza C, rented		83
550 watt Madza C, rented		82
72 watt Tungsten, rented		6
Total		61,212

Additional lamps totaling 9,165 in all sizes, but mostly 40, 75 and 100 watts, are operated by the West Park Commisioners, Lincoln Park Commissioners, and South Park Commissioners with power supplied by the Sanitary District.

NORTH SHORE CHANNEL.

Lake Michigan at Wilmette to North Branch Chicago Fiver at Lawrence Ave.

Work started Sept. 12, 1907; water turned in Nov. 29, 1910.
Capacity, 1,000 cu. ft. per second.
Length of Canal, 8.14 miles.
Base, 26 to 30 ft.
Depth of water, 13.6 ft.
Width of cut, 120 to 140 ft.
Average cross-section of flow, 720 sq. ft.
Gradient, about 1 in 20,000.
Width, 75 ft. to 80 ft. at water surface.
Side slopes, 1 vertical on 2 horizontal and 3 vertical on 5 horizontal.
Average excavation, 85 cu. yds. per lineal foot.

Wilmette Pumping Station and Sheridan Road Bridge.

Lift—3 feet.
Pumps—4 horizontal screw pumps, 9 ft. diameter.
  Capacity, 250 cu. ft. per sec. at 75 rev. per min.
  Geared to motors; capacity, 150 H. P. each.
  3 phase, 60 cycles, 440 volts.
Lock—32 ft. wide, 130 ft. long, 11 ft. deep.

Cost.

Right of way	$1,188,529.19
Wilmette Pumping Station	497,976.43
Channel construction	1,244,913.15
Bridges	625,684.24
Engineering	230,843.39
Total	$3,769,964.40

CALUMET SAG CHANNEL

(Under Construction.)

Connects Little Calumet River just east of Blue Island with Main Channel at Sag.

Capacity, 2,000 cubic feet per second.

Length of canal, about 16¼ miles.

Earth Section.

Base, 36 feet. Depth, 20 feet.
Grade, about 1 in 37,000. Side slopes, 1 on 2 (Riprapped).
Width at water surface, 116 feet.

Modified Earth Section.

Base, 50 feet. Side slopes, 1 on 1 below
Grade, about 1 in 37,000. elevation—-4.
Depth, 20 feet. (Riprapped) 1 on 2 above
elevation—-4.
Width at water surface, 98 feet.

Rock Section.

Base, 60 feet. Depth, 20 feet.
Grade, about 1 in 37,000. Vertical channeled sides with
concrete walls on rock.
Width at water surface, 64 feet.

Lie-Byes with bottom width of 100 feet every 3 miles.

Fixed bridges with minimum clearance of 16½ feet.

Controlling Works East of Blue Island.

Consists of ordinary lock, equipped with steel sector gates which can be operated either electrically or by hand against a head, to regulate flow of water.

Length of lock, 400 feet. Depth of lock, 24 feet.
Width of lock, 50 feet.

Estimated Cost When Completed.

Right of way	$ 600,000
Channel construction	10,000,000
Bridges (24 fixed)	900,000
Controlling works	400,000
Engineering	850,000
Total estimated cost	$12,750,000

Will be completed in 1921.

CHICAGO RIVER.

South Branch From Lake Street to Robey Street.

Length, 5 miles.

Work consisting of widening and deepening was commenced in May, 1897, and completed in 1920.

Minimum Cross-Section.

Width, 200 feet between dock lines.

Depth, 26 feet for middle 100 feet, shoaling to 16 feet at face of dock.

Minimum channel width at bridges, 120 feet.

Established clearance wider bridges, 165 feet.

Cost to December 31, 1917.

Right of way	$ 6,061,448.23
River improvement	2,229,277.29
Bridges	3,358,402.40
Engineering	558,451.40
Total	$12,207,579.32

North Branch From Belmont Avenue to Lawrence Avenue.

Length, 2.2 miles.

Original work consisting of straightening, widening and deepening was commenced May 10, 1904, and completed Dec. 2, 1907.

Minimum Cross-Section.

Width, 90 feet. Depth, 12 feet.

Channel was redredged from Lawrence to Belmont Avenue between May 11, 1911, and June 11, 1912.

Middle 20 feet of Channel between Belmont Avenue and Roscoe Street was deepened to 15 feet in 1917.

Cost to December 31, 1918.

Right of way	$ 17,150.00
River improvement	343,115.62
Bridges	25,512.66
Engineering	45,081.00

INTERCEPTING SEWERS.

West Thirty-ninth Street Conduit.

Receives sewage from Ashland Ave. and Robey St.
Empties into Western Ave. sewer.
Concrete section, 14 ft. deep x 12 ft. wide inside.
Average depth of cut for sewer invert, 23.5 feet.
2,346 lineal feet. Cost, $79,746.46.
Proportional cost of Western Ave. sewer, $78,069.58.

Stockyards Intercepting Sewer.

Carries sewage from Ashland Ave. and Robey St. to West 39th St. conduit.

Brick arch and concrete bottom.
Size, 8 ft. x 9 ft. and 7 ft. x 7 ft.
3,450 lineal feet. Cost, $113,787.94.

Union Stock Yards and Transit Co. paid $25,000 towards the cost.

North Shore Intercepting Sewer.

Diverts sewage from Lake Michigan from north line of Glencoe to Evanston and from Skokie Marsh, serving Glencoe, Winnetka, Kenilworth, Gross Point and Wilmette. Empties into North Shore Channel. Concrete. All sections egg-shaped unless otherwise noted.

Sheridan Road, North Shore Channel to Winnetka Ave.
10,109 lineal feet, 6 ft. x 9 ft. open cut.
Sheridan Road, Winnetka Ave. to Cherry St.
4,250 lineal feet, 6 ft. x 8 ft. open cut.
Skokie Branch.
From 40 in. x 60 in. to 30 in. x 34 in.
Also 24 in. tile, etc. Mostly tunnel.
Cost, $627,553.42.

Calumet Intercepting Sewer.

Diverts sewage from the Calumet River from territory south of 87th St. west to Halsted St. and north of the Calumet River, including portion of South Chicago south and east of Calumet River to 114th St.

Concrete. All cross-sections horseshoe shape, unless otherwise noted.

Section 1. To be built.
Connection to 95th St. Pumping Station.
Extension along north bank of river to The Strand.
Extension under river to pick up portion of South Chicago south and east of river.
Estimated cost, $800,000.00.

Section 2.
Along 97th St. from Baltimore Ave. to Torrence Ave.
4,280.5 lineal feet of 8.8 ft. x 11 ft. open cut.
Cost, $182,401.48.

Section 3.
Along Torrence Ave. to 100th St., thence westerly to 103d Street.
7,645 lineal feet of 10.4 ft. x 13 ft. open cut.
Cost, $319,682.95.

Section 4.
Along 103d St. to Corliss Ave., south to 104th St., west to South Park Ave.
8,563 lineal feet of 13.2 ft. x 16 ft. 6 in. open cut.
Cost, $606,364.27.

Section 5.
South on South Park Ave. from 104th St. to 114th Place, west to Prairie Ave.
8,163 lineal feet of 14 ft. x 17 ft. 6 in. open cut.
Cost, $697,572.16.

Section 6.
South on Prairie Ave. from 114th Place to 120th Place, west to Indiana Ave. and south to 125th St.
7,076 lineal feet of 14 ft. x 17 ft. 6 in. open cut.
Cost, $608,525.74.

Section 7.

Discharge from Calumet Sewage Pumping Station to Calumet Sag Channel, west of the controlling works.

Westerly on 125th St., Indian boundary line, 127th St. and Blue Island and Riverdale Road, south to controlling works.

1,056.3 lineal feet of 13 ft. 4½ in. x 16 ft. open cut.

5,380 lineal feet to 16 ft. x 16 ft. open cut.

597.2 lineal feet of 13 ft. x 16 ft. box section open cut.

Cost, $863,516.06.

Section 8. Under construction.

Storm overflow to Calumet River from Calumet Sewage Pumping Station.

1,770 lineal feet of 13 ft. x 10.25 ft. open cut.

Estimated cost about $139,240.

Section 9.

West from Calumet Sewage Pumping Station.

Picks up Wentworth Ave. and Halsted St. dry flow for treatment.

2,700 lineal feet of 6 ft. 6 in. semi-elliptical tunnel.

Fifty-second Avenue Sewer.

Intercepts South 56th and South 52d Ave. sewers and discharges into Main Channel at South 52d Ave.

1,850 lineal feet of 12 ft. 3 in. x 16 ft.
2,640 lineal feet of 10 ft. 6 in. circular.
600 lineal feet of 9 ft. circular.
200 lineal feet of 7 ft. 6 in. circular.
Cost, $248,795.75.

Des Plaines River Intercepting Sewer.

This sewer intercepts the sewage discharged into the Des Plaines River from the villages of Maywood, River Forest, Forest Park, Melrose Park and part of Oak Park. Provision is also made for taking care of the new government Speedway Hospital and the villages of Broadview and Bellewood. The purpose is to intercept the dry weather flow of the sewers discharged into the Des Plaines River between Twelfth Street and Chicago Avenue and carry the flow south along First Avenue to the Des Plaines River Treatment Plant, located about 900 feet south of Twelfth Street east of First Avenue. The work was built largely in tunnel, and ranges from 6 in. to 5 ft. 6 in. in size, of circular shape, and includes four crossings of the Des Plaines River, to pick up sewers lying east of the river.

The work was finished in 1920 at a cost of $573,402.97.

Evanston Intercepting Sewer.

Carries sewage from entire water front of Evanston and north end of Chicago, west on Lake St. and Emerson St. to North Shore Channel.

Sizes vary from 6 inches to 10 feet.

Largely built in tunnel. Completed in 1920.

Cost $1,045,706.76.

Niles Center Outlet Sewer.

Carries sewage from Niles Center to North Shore Channel.

20-inch tile, 10,127 lineal feet.

Cost, $24,437,43.

39th Street Conduit Extension.

Extension of conduit on West 39th St. from Halsted St. to west of Racine Ave. To be built in bed of Stockyards Slip.

Conduit to be 22 ft. wide x 23 ft. high, inside, reinforced, from Halsted St. to near Racine Ave., and 25 ft. wide x 25 ft. high, to outlet.

When completed, will permit extension of West 39th St. through to Ashland Ave.

Diversion Channel on south bank completed in March, 1921, at a cost of about $425,000.00.

Oak Park Sewer Outlet.

This sewer serves as an outlet for the northern end of Oak Park.

To be built in Chicago Ave. from Euclid Ave. to Harlem Ave., Harlem Ave. to Iowa St., Iowa St. to Thatcher Ave., Thatcher Ave. to Chicago Ave., where it connects with the Des Plaines Intercepting Sewer.

Size 6 ft. diam. in Oak Park and 6 ft. 6 in. diam. in River Forest.

Estimated cost about $50,000.

North Side Intercepting Sewer and Treatment Works

will divert the sewage from the North Shore Channel and North Branch of the Chicago River from territory north of Diversey Street east of the Channel, and Fullerton Avenue west of the Channel. This will receive the sewage of a large portion of the North Side of Chicago and from Evanston, Wilmette and the North Shore towns. The first contract will consist of approximately 24,000 lineal ft. of 6 ft. 6 in. and 4 ft. 6 in. sewer from Oakton Avenue to Wilmette.

A site has been purchased at Oakton Avenue and the North Shore Channel, where a sewage treatment plant will be constructed.

THIRTY-NINTH STREET SEWAGE PUMPING STATION.

Thirty-ninth Street and Lake Michigan.

.. Pumps sewage from main intercepter South Side. Also lake water to flush Bubbly Creek. Built jointly by City of Chicago and The Sanitary District.

Boiler House.

6 units, 265 H. P. Aultman-Taylor boilers equipped with Babcock & Wilcox Automatic stokers.

2 units, 500 H. P. each, Edgemoor boilers equipped with Taylor Automatic stokers.

Screw Pumps.

Two, each unit.

Capacity, 1,000 cu. ft. per sec.; lift, 4 ft., 55 rev. per min.

Diameter of propeller, 14 ft. 9 in.; 6 blades.

Triple-expansion vertical engines, 22 in., 38 in., 62 in. x 42 in. stroke. High-pressure tandem with intermediate. Allis-Chalmers make.

Duty on official test, 150 million ft. lbs. per 1,000 lbs. steam for 694 c.f.p.s. through 7 ft. lift.

Sewage Pumps.

Four—Vertical Shaft.

Two units—
75 cu. ft. per sec. each. Lift, 10 to 28 ft.
90 to 125 rev. per min.
Engine—12 in., 22 in., 32 in. x 30 in. stroke.

Two units—
250 cu. ft. per sec. each. Lift, 5 to 20 ft.
40 to 80 rev. per min.
Engine—16 in., 30 in., 46 in. x 30 in. stroke.

All driven by triple-expansion engines, horizontal, set 120 degrees around vertical shaft.

Modified Corliss valve gear. Allis-Chalmers make.

Condensers.

Tomlinson "A." Barometric type.

Pumping of sewage, 45 to 1,000 million gallons per 24 hours.

Area drained, about 22 square miles.

Turbine Generator.

4,000 k.v.a. capacity at full load 2300 volts, 60 cycle current, Westinghouse make.

Cost of Pumping Station, $1,402,962.23.

LAWRENCE AVENUE SEWAGE PUMPING STATION.

Lawrence Ave. and C. M. & St. P. R. R. (N. W. El.)

Pumps sewage from main intercepter North Side. Also lake water to flush North Branch of Chicago River. Built by City of Chicago.

Boiler House.

2 units, 280 H. P. Edgemoor horizontal boilers, water tube, Green chain grate stoker. 7 ft. x 9 ft. effective grate area.

Screw Pump.

Capacity, 585 cu. ft. per sec. Lift, 3+ ft. 40 r.p.m.

Diameter of propeller, 13 ft. 6 in.; 6 blades.

Triple-expansion vertical engines, 18 in., 32 in., 48 in. x 42 in. stroke.

High-pressure tandem with intermediate. Allis-Chalmers make.

Sewage Pumps.

Three—Vertical Shaft.

One unit—
  37½ cu. ft. per sec. Lift, 10 ft.
  95 to 105 rev. per min.
  Engine—8 in., 17 in. x 24 in. stroke.
Two units—
  125 cu. ft. per sec. Lift, 5 ft.
  60 to 70 rev. per min.
  Engine—12 in., 24 in. x 30 in. stroke.

All driven by compound engines, horizontal, set 120 degrees around vertical shaft.

Modified Corliss valve gear.

Allis-Chalmers make.

Condensers.

Tomlinson "A." Barometric type.

Pumping of sewage, 25 to 192 million gallons per 24 hours.

Area drained, about 6 square miles.

EVANSTON SEWAGE PUMPING STATION.

Elmwood Avenue and Lake Street, Evanston.

Pumps sewage from low level intercepter.

Electrically driven by power from Lockport.

Transformers.

6, 100 K. V. A., 12,000 to 220-440 volt.
60 cycle, single-phase, self-cooled.

Centrifugal Pumps.

6 vertical shaft trash pumps.
3 units—
    35 cu. ft. per sec. each. Lift, 10 ft.
    200 rev. per min. Motor, 100 h. p.
3 units—
    9.6 cu. ft. per sec. each. Lift, 10 ft.
    257 rev. per min. Motor, 25 h. p.

All driven by vertical shaft, squirrel cage induction motors, 440 volts, 3 phase, 60 cycle.

Motors, General Electric Company make.

Pumps built by American Well Works from designs of A. B. Wood.

Area served, about 600 acres.

Completed in 1920, at a cost of $337,132.52.

CALUMET SEWAGE PUMPING STATION.

125th and Indiana Avenue.

Pumps sewage from Calumet Intercepting Sewer. Electrically driven by power from Lockport.

Transformers.

6, 1,000 K. V. A. Stepdown from 12,000 to 2,300 volts.

Centrifugal Pumps.

6, horizontal shaft, set above suction chambers.

3 units—

75 cu. ft. per sec. each.	Lift, 23 to 30 ft.
260 rev. per min.	Motor, 250 h. p.

2 units—

275 cu. ft. per sec. each.	Lift, 23 to 30 ft.
150 rev. per min.	Motor, 1,000 h. p.
OR, 230 cu. ft. per sec. each.	Lift, 10 to 11.5 ft.
106 rev. per min.	Motor, 375 h. p.

1 unit—

275 cu. ft. per sec.	Lift, 23 to 30 ft.
150 rev. per min.	Motor, 1,000 h. p.

All driven by horizontal shaft synchronous motors, 2,300 volts, 3 phase, 60 cycle.

All primed by rotary vacuum pumps.

Motors, Westinghouse Electric & Manufacturing Company.

Pumps built by Southwark Foundry & Machine Company from design by A. B. Wood.

This station covers the territory south of Eighty-seventh Street, about 12,000 acres, and will handle from 40 to 700 cu. ft. per second. The sewage ordinarily will be pumped to the Controlling works. In an emergency it can be pumped to the Calumet River by the two pumps, using slow-speed motors.

Completed in 1920, at a cost of $1,355,102.64.

CALUMET POWER STATION.

125th Street and Indiana Avenue.

Adjoining Calumet Sewage Pumping Station.

Furnishes standby electrical service for Calumet Sewage Pumping Station and Sewage Pumping Station in South Chicago at head of Calumet Intercepting Sewer.

Power Units.

4, full Diesel type engines, each direct connected with extension shaft to engine type generator and overhung exciter.

Engines.

750 brake horse power each—180 R. P. M.

Diesel oil engines, vertical, two stroke cycle, single acting, cross head type.

Built by Busch-Sulzer Bros.—Diesel Engine Comany.

Generators and Exciters.

Generators—500 K. W. each at 80 per cent power factor, engine type, 3 phase, 60 cycle, 2300 volts.

Exciters—16 K. W. each, 125 volts, shunt wound, General Electric Company.

Under construction, 1920-21.
To be completed in 1921.
Estimated cost of Power Station $1,100,000.00.

DES PLAINES RIVER SEWAGE TREATMENT WORKS.

Fourteenth Street and Des Plaines River.

Pumps sewage from Des Plaines River intercepting sewer.
Treats sewage by activated sludge process.
Electrically driven by power from Lockport.

Pumping Station and Blower House.

Transformers.

4, 300 K. V. A. Stepdown from 12,000 to 220-440 volts.

Centrifugal Pumps.

3, vertical shaft, trash pumps.

Units—

6.5 cu. ft. per sec. each.	Lift, 25 to 32 ft.
400 rev. per min.	Motor, 50 h. p.

All driven by vertical shaft, squirrel cage induction motors, 440 volts, 3 phase, 60 cycle.

Motors, General Electric Company make.

Pumps built by Dayton-Dowd Company from designs of A. B. Wood.

Blowers.

Hydro-turbine type.

Units	Capacities in cu. ft. per min.	Pressure lbs. per sq. in.
1	2,400	8.5
2	2,800	6.5
1	2,000	6.5
1	1,000	6.5
1	500	6.5

Driven by induction motors. 4 at 150 h. p., 1 at 75 h. p., 1 at 50 h. p., 440 volt, 3 phase, 60 cycle, chain drive.

Blowers, Nash Engineering Company make.

Activated Sludge Plant.

To handle a flow of 4,500,000 gallons per 24 hours from a population of over 40,000. Practically all domestic sewage. The sewage will be pumped through a Venturi meter into a grit chamber, followed by a self-cleaning screen with openings 1/16x2 inches. The aeration tanks comprise four, one at 15 ft. depth, 3 at 10 ft. depth. The filtros plate areas are approximately 1 to 5.7. The plant is arranged to compare various methods of operation, straight flow, reaeration of sludge, and reaeration and resettling of sludge. The aerated liquor will be settled in settling tanks, half of which are hopper bottoms, and half Dorr type, with a squeegee cleaning device. The period of aeration is expected to be about four hours. The tanks and piping are extremely flexible to permit ready changes. Apparatus will be provided for pressing and drying sludge to form commercial fertilizer.

Under construction, 1919-21.

Estimated cost of complete works, $800.000.00.

MORTON GROVE TREATMENT PLANT.

Treats sewage of the village of Morton Grove before discharge into North Branch of Chicago River. Population served about 1,000. Designed for 1,200.

Imhoff tank, sludge pump and sludge beds.
Cost, $12,815.

Covered sprinkling filter, 2 beds each, 35x36 ft.
Stone, 6.25 to 6.5 ft. deep, 1¼ to 2 in.
Secondary settling basins.
Cost, $38,880.66.

CALUMET SEWAGE TREATMENT WORKS.

125th Street and Cottage Avenue.

Receives sewage from Calumet sewage pumping station.

Treats sewage by sedimentation.

Part of sewage also treated by activated sludge or sprinkling filter.

Electrically driven by power from Lockport.

Plant designed to handle 56 million gallons per 24 hours.

Present population tributary, estimated, 142,000.

Sewage received at plant measured by Venturi meter, 72 by 36 inch.

All sewage passes through coarse rack screens.

Sedimentation Plant.

Double deck or Imhoff tanks, 30 units.

Each unit approximately 34 ft. 6 in. wide by 103 ft. 6 in.

Depth from water surface to bottom, 25 ft.

Settling capacity, 29,000 cu. ft. per unit.

Sludge capacity, 16,300 cu. ft. per unit.

Design based on 2.9 hr. period at 250 gal. per capita and 2.3 cu. ft. sludge volume per capita.

Sludge beds, 71,000 sq. ft. total area, based on 0.33 sq. ft. per capita.

Tanks designed to be converted into activated sludge plant.

Sprinkling Filter.

Following one Imhoff unit is sprinkling filter, receiving settled sewage, pumped by centrifugal pumps to dosing tanks.

Area sprinkling filter, 0.742 acres. Concrete block underdrains.

Depth of stone, 6 ft. 9 in. Stone, 1 in. to 2 in.

Dosed by two siphon chambers discharging alternately.

Estimated rate dosing, 2.4 million gals. per acre per 24 hrs.

Sprinkling filter is followed by secondary settling tank of Dortmund pattern. Two units each, 30 feet. diameter; depth of water, 20 ft. 2 in. Detention period, 1.5 hrs., with flow 1.75 mgd.

Sludge from secondary settling tank to be pumped back into primary Imhoff tank.

Activated Sludge.

Two activated sludge units, each handling average flow of 1.75 million gallons per 24 hrs.

One receives settled sewage, the other raw sewage. Detention period, 4 hrs., with 25 per cent returned. Each unit has volume of 362,000 gallons. Depth of water over the filtros plates 14 ft. 4 in.

Fitros plate area, 24 per cent of tank area.

Secondary settling tank following aeration tanks are of the Dorr type, each 34 ft. diam. Depth of water, 15 ft. The sludge is pushed to the center by a revolving squegee. Rate at average flow is 1,550 gal. per sq. ft. per day.

Blower House.

Press and Dryer House.

Administration and Laboratory Building.

Apparatus will be provided for pressing and drying the sludge to form commercial fertilizer.

Under construction, 1920-21.

Estimated cost of complete works, $5,200,000.

Conduits.

The raw sewage will be pumped from the Calumet sewage pumping station through two barrels of a three-barreled conduit under the Illinois Central and Chicago and Western Indiana railroads. The plant effluent will return in the third barrel to enter the outfall of the controlling works of the Calumet sag channel.

Conduits of reinforced concrete.

Semi-elliptical, 5 ft. 6 in. by 5 ft. 6 in., 7 ft. 6 in. by 7 ft. 6 in., 9 ft. by 9 ft., inside dimensions. Built largely in tunnel.

Completed in 1921, at a cost of $614,751.38.

TESTING STATIONS AND LABORATORY.

Tannery Testing Station.

Located at 884 North Halsted Street.

Handling waste from Tannery of Griess-Pfleger Tanning Company.

This tannery operates with a chrome tan on hides. There are five effluent pipes to the river. The effluents from three typical sewers from the beam house and from the tan yard are combined in the testing plant. The testing station includes a rotary screen 20 in. in diameter by 2 ft. effective length, with the flow from the outside to the inside on the beam house waste; a grit chamber for the heavy limes 5 ft. wide by 10 ft. deep by 15 ft. long with three hoppers in the bottom; a Dorr thickener in a tank 19 ft. 11 in. in diameter and 6 ft. deep, in which the combined effluents are settled; four aeration tanks each 6 ft. wide by 12 ft. deep by 23 ft. long with 11 ft. effective water depth, the filtros plates having an effective area of 17.4 per cent of the water surface, set in pre-cast concrete containers; a secondary settling tank of the Dorr type 11ft. 6 in. in diameter by 11 ft. 4¾ in. deep, with a flat bottom and special squegees; two Connersville blowers of capacity 150 cu. ft. per minute and 300 cu. ft. per minute, driven respectively by motors of 10 and 20 horsepower. In addition, the equipment includes sludge-drying beds 11 ft. 8 in. by 11 ft. 8 in. in plan, divided into four sections and four intermittent filters, each 5 ft. 9 in. square, containing respectively 3 ft. deep, 5 ft. 6 in. deep, 2 ft. 6 in. deep, of sand, and 5 ft. deep of cinders; further a cinder bed 20x20 ft. square, 5ft. deep, and a sprinkling filter 14 ft. square, 6½ ft. deep, of 1¼ to 2 in. broken stone.

Storage tanks are provided also to allow operation of the filters continuously through 24 hours.

Corn Products Testing Station.

Located at Argo.

Handling waste from works of Corn Products Refining Company.

This factory grinds corn (capacity 65,000 to 75,000 bushels per 24 hrs.) and makes starch, glucose, cattle feed, soap, corn oil, and other corn products. The principal waste is from the gluten settlers, with a small amount from the starch cones, soap works, bone charcoal filters, etc. These are all combined with the human excreta and condenser water, discharging in one sewer to the main channel.

The testing station includes a grit chamber 6 in. wide by 18 in. deep by 15 ft. 8 in. long inside, feeding two types of activated sludge plant. One contains three aeration tanks, each 6ft. wide by 12 ft. deep by 23 ft. long inside width, 11 ft. effective water depth, the filtros plates having an effective area of 17.4 per cent of the water surface, set in pre-cast concrete containers; and a secondary settling tank of the proper bottomed type 6 ft. internal diameter and 12 ft. deep. The plant consists of a Dorr-Peck apparatus built in two tanks, one 20 ft. diameter, the other 14 ft. diameter, with 11 ft. effective water depth. This a double deck apparatus with aeration below and settling above, each deck being provided with a rotating squegee to keep the activated sludge moving.

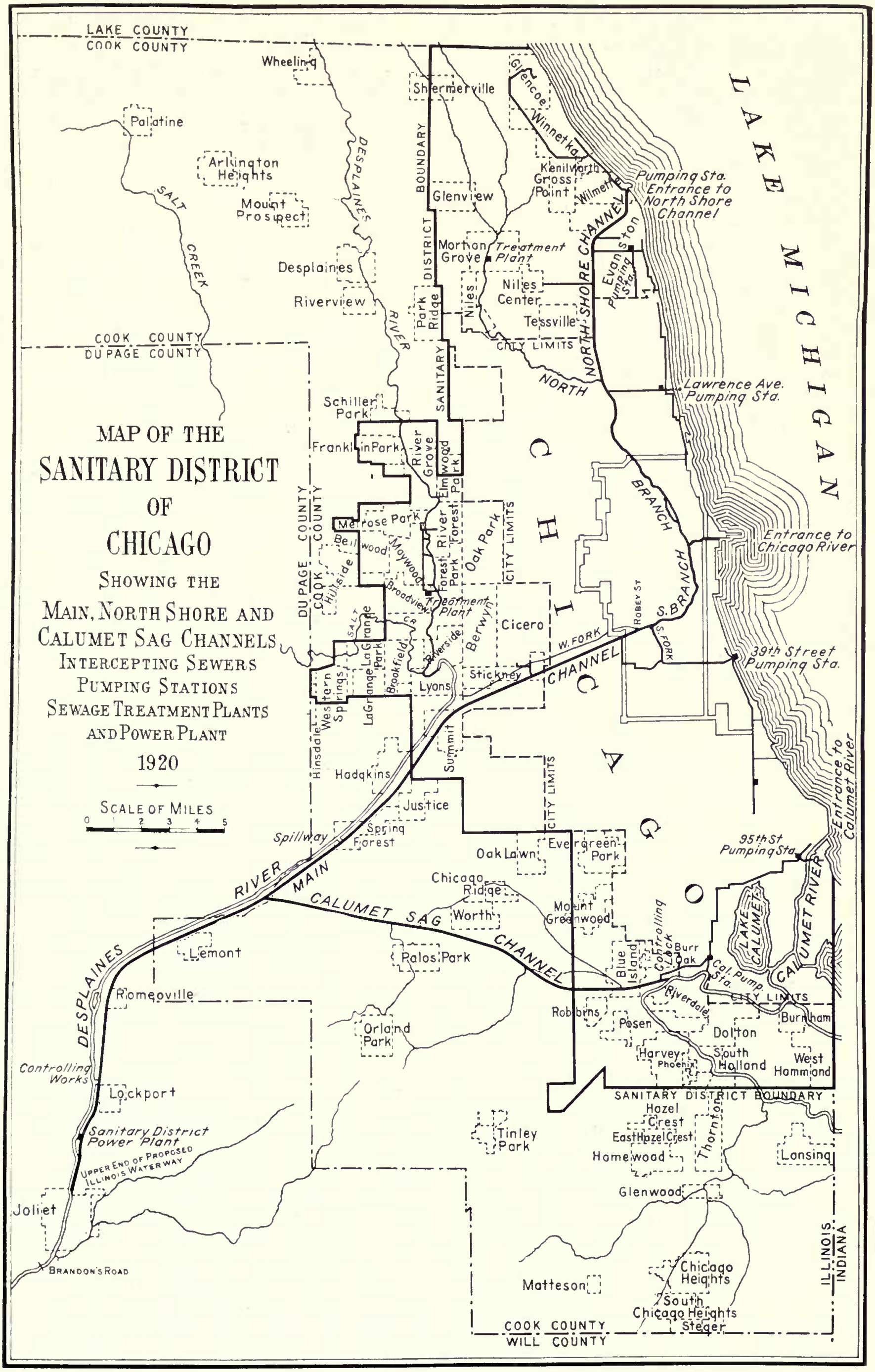
The equipment also includes a Nash Hydro-turbine blower of capacity 450 cu. ft. per minute driven by a motor of 25 H. P.

Laboratory.

At Thirty-ninth Street Pumping Station.

Equipped for chemical and bacteriological work on water and sewage.

The laboratory of the Sanitary District is established in a wing of the Thirty-ninth Street Pumping Station, located on the lake front. The equipment is complete for sanitary water and sewage analyses. The work is carried out here for the testing stations and periodic examination of the main channel, Chicago, Des Plaines and Illinois Rivers. Special examinations are also made of soils, oils and engineering materials. Field laboratories are maintained at testing stations for certain routine tests.



MAP OF THE
SANITARY DISTRICT
OF
CHICAGO
SHOWING THE
MAIN, NORTH SHORE AND
CALUMET SAG CHANNELS
INTERCEPTING SEWERS
PUMPING STATIONS
SEWAGE TREATMENT PLANTS
AND POWER PLANT
1920

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